IN THE SPECIFICATION:

Please amend paragraphs [017], [020], [021], [031], [033], [034], [035], [039], [042], [045], [047], [050], [051], [058], [060], and add paragraph [067] as shown below, in which deleted terms are shown with strikethrough and added terms are shown with underscoring.

Paragraph [017]

The method may further include (d) determining the conversion function through the normalization of the fatigue limit~~;~~.

Paragraph [020]

In another aspect of the present invention, a software product executed by a computer and recording codes of a method ~~which is achieved by~~ comprising the steps of (a) acquiring a stress applied to each of meshes of a part; ~~by~~ (b) normalizing the stress using a conversion function for converting fatigue limit for a material of each of meshes of a part and for every temperature into a normalized fatigue limit which does not depend on the temperature; and ~~by~~ (c) calculating the fatigue safety factor of each of the meshes of the part based on the normalized fatigue limit obtained by normalizing the fatigue limit using the conversion function and the normalized stress.

Paragraph [021]

In accordance with the software product, the method may further include (d) determining the conversion function through the normalization of the fatigue limit~~;~~.

Paragraph [031]

Hereinafter, a fatigue safety factor testing apparatus of the present invention will be described with reference to the attached drawings. In the following, the fatigue safety factor testing apparatus used for engine design of a vehicle will be described as an example, but the

present invention is not limited to it and is applicable to the design and development of other buildings and structures.

Paragraph [033]

In the fatigue safety factor testing apparatus 1, the CPU contains ~~of~~ a conversion function generating section 10, a model generating section 11, a condition setting section 12, an FEM calculating section 13, a normalized stress calculating section 14, and a fatigue safety factor calculating section 15. All of them are realized as sections for executing a series of programs stored in the storage section 3.

Paragraph [034]

Also, the storage section 3 stores a stress data table 17 and a function table 18. The stress data table 17 stores relationship data of a kind of material and a fatigue limit diagram indicating relationship between mean stress and amplitude stress. The function table 18 stores relationship data of a kind of material and conversion functions for normalizing and converting the fatigue limit diagram to the material for every temperature into the normalized fatigue limit diagram independent from temperature and material.

Paragraph [035]

The conversion function generating section 10 executes a software program and generates a conversion function A and a conversion function B from a fatigue limit diagram for a kind of material stored in the stress data table 17 and stores the same in the function table 18. The conversion functions A and B are used to generate the normalized fatigue limit diagram.

Paragraph [039]

The normalized stress calculating section 14 executes a software program and normalizes the stress applied to a part by using the fatigue limit diagram for the material of the part for every temperature of the part and outputs ~~as~~ a normalized stress. That is, the stress of the fatigue limit diagram corresponds to the normalized stress of the normalized fatigue limit diagram.

Paragraph [042]

In the fatigue limit diagram shown in Fig. 2A, the horizontal axis is mean stress $\sigma 1$ and the vertical axis shows amplitude stress $\sigma 2$. A curve Q_1 (point a_1 - point b1 - point e_1 - point c_1 - point d_1), a curve Q_2 (~~Point~~ point a_2 - point b_2 - point e_2 - point c_2 -point d_2), and a curve Q_3 (point a_3 - point b_3 - point e_3 - point c_3 - point d_3) are the fatigue limit diagram at the room temperature (24 °C), 100 °C, and 200 °C, respectively. The fatigue limit diagram is a graph showing a value of the fatigue limit for every temperature, and is generally determined depending on the material but the profile is different. Fig. 2A is only an example. Also, in the temperature range in which the engine is used, the profile becomes smaller in size similarly with the increase of the temperature (the curve Q_1 to the curve Q_2, to the curve Q_3).

Paragraph [045]

The conversion function f is used for the conversion from the fatigue limit diagram into the normalized fatigue limit diagram. For example, as for the point $P(\sigma 1_P, \sigma 2_P)$, elements are converted into $\sigma U1_P = f_A(\sigma 1_P, T)$ and $\sigma U2_P = f_B(\sigma 2_P, T)$, and the point $P(\sigma 1_P, \sigma 2_P)$ is converted into a point $P_0(\sigma U1_P, \sigma U2_P)$. Because the fatigue limit diagram is not constant and is different depending on a kind of the material and temperature, the material conversion function $f(\sigma, T)(f_A(\sigma 1, T), f_B(\sigma 2, T))$ is set for every kind of material.

Paragraph [047]

As known, the fatigue limit diagram becomes smaller similarly ~~or~~ while keeping the shape as the temperature increases. Therefore, a coefficient $q(T)$ is determined which becomes larger when temperature T becomes higher from a reference temperature T_0 and becomes smaller when temperature T becomes lower from the reference temperature T_0. The coefficient $q(T)$ is determined from the fatigue limit diagram for every material. That is, the point $P(\sigma 1_P, \sigma 2_P)$ is mapped into a point $P_0(q(T)\cdot k\cdot r, q(T)\cdot\theta)$ on the polar coordinate system and the point $P_0(\sigma U1_P, \sigma U2_P)$ in the $\sigma 1$-$\sigma 2$ coordinate system. From this,

$\sigma U1_P = f_A(\sigma 1_P, T)$

$= q(T) \cdot k \cdot r \cdot \cos\theta$

$= q(T) \cdot k \cdot (\sigma 1^2 + \sigma 2^2)^{1/2} \cdot \sigma 1 \cdot (\sigma 1^2 + \sigma 2^2)^{-1/2}$

$\sigma U2_P = f_B(\sigma 2_P, T)$

$= q(T) \cdot k \cdot r \cdot \sin\theta$

$= q(T) \cdot k \cdot (\sigma 1^2 + \sigma 2^2)^{1/2} \cdot \sigma 2 \cdot (\sigma 1^2 + \sigma 2^2)^{-1/2}$

where $r = (\sigma 1^2 + \sigma 2^2)^{1/2}$

$\cos\theta = \sigma 1 \cdot (\sigma 1^2 + \sigma 2^2)^{-1/2}$

$\sin\theta = \sigma 2 \cdot (\sigma 1^2 + \sigma 2^2)^{-1/2}$

Paragraph [050]

Next, the stress data table 17 of storage section 3 will be described. Fig. 4 is a diagram showing the stress data table ~~3~~ 17. The stress data table 17 stores relationship data of a kind of the material and a fatigue limit diagram showing the relationship between the mean stress and the amplitude stress. The stress data table 17 has fields of material 17-1, temperature 17-2, mean stress 17-3, and amplitude stress 17-4. The material field 17-1 stores a kind of material, and contains a case of different states in the same kind of material. The temperature field 17-2 stores the temperature of the material. The means stress ~~filed~~ field 17-3 and the amplitude stress field 17-4 store relations of the mean stress and the amplitude stress in case of the material in the material field 17-1 and the temperature in the temperature field 17-2. The stress data table ~~3 shows~~ 17 corresponds to the graph shown in Fig. 2A. It is not necessary to prepare many temperature data as data in the temperature ~~filed~~ field 17-2 for every material. It is sufficient to prepare the temperature data for the temperatures of 20 °C, 50 °C and 100 °C. Thus, the number of data to be stored can be restrained.

Paragraph [051]

Fig. 5 is a diagram showing the function table 18. The function table 18 stores relationship data of a kind of the material and the conversion functions. The material field 18-1 is the same as the material field 17-1. The conversion function A 18-2 and the conversion function B 18-3 are functions used to convert or map data on the fatigue limit diagram into the

data on the normalized fatigue limit diagram. The conversion function A 18-2 is for mean stress $\sigma 1$ and the conversion function B 18-3 is for amplitude stress $\sigma 2$. The details are already described referring to Figs. 2A and 2B. For example, in the examples shown in Figs. 2A and 2B, the conversion function A 18-2 is $f_A(\sigma 1\backslash T) = q(T)\cdot k\cdot(\sigma 1^2+\sigma 2^2)^{1/2}\cdot\sigma 1\cdot(\sigma 1^2+\sigma 2^2)^{-1/2}$, and the conversion function B 18-3 is $f_B(\sigma 2\backslash T) = q(T)\cdot k\cdot(\sigma 1^2+\sigma 2^2)^{1/2}\cdot\sigma 2\cdot(\sigma 1^2+\sigma 2^2)^{-1/2}$. It should be noted that the conversion function A 18-2 and the conversion function B 18-3 are generated by the conversion function generating section 10 and are stored in the function table 18. However, they may be previously prepared. In this case, a part of the following calculation process can be omitted.

Paragraph [058]

(6) Step S06

The fatigue safety factor calculating section 15 calculates the fatigue safety factor of the part based on the normalized fatigue limit diagram calculated from the fatigue limit diagram using the conversion functions ~~or~~ stored in the stress data table 17 and the normalized stresses calculated at the step S05 by the method described with reference to Fig. 3. Then, the fatigue safety factor calculating section 15 controls the display section 5 to display each of tetra meshes in the color corresponding to a value of the calculated fatigue safety factor.

Paragraph [060]

Here, the data about each of the tetra meshes in the step S05 and the step S06 will be further explained. Figs. 7A to 7C are diagrams showing ~~that~~ the data of each of the tetra meshes in the steps S04 to S06. Sheets 21 to 23 show data in the steps S04 to S06, respectively. In each sheet, Node is an identification number which distinguishes each of the plurality of tetra meshes in the FEM model, and σ, T, σU and Saf are the stress, the temperature, the normalized stress and the safety factor in each of the tetra meshes, respectively (only the amplitude stress is shown in Figs. 7A to 7C as the stress and the normalized stress). The FEM analysis is accomplished at the step S04 and the relationship between σ and T for every tetra mesh is obtained as shown by the sheet 21 shown in Fig. 7A. Next, the calculation ($\sigma U = f(\sigma, T)$) of the normalized stress is

accomplished at the step S05 by using the conversion functions f about each data, and σU for each of the tetra meshes is obtained as shown by the sheet 22 of Fig. 7B. Then, the calculation ($Saf = A/B$) of the fatigue safety factor is accomplished at step S06 and the fatigue safety factor Saf for each of the tetra meshes is obtained as shown by the sheet 23 Fig. 7C.

Paragraph [067]

Although there has been described what is the present embodiment of the invention, it will be understood by persons skilled in the art that variations and modifications may be made thereto without departing from the spirit and scope of the invention set forth in the appended claims.